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Capital structure and the choice of enterprise form: theory and history

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Abstract

A considerable theoretical and empirical literature studies the corporation's capital structure. Economists have paid less attention to capital structure in other enterprise forms such as partnerships, which typically operate under different legal constraints and appeal to smaller enterprises. Yet partnerships were the dominant business organization for the period in which wealthy countries first experienced long-run economic growth, and they remain quantitatively significant in some important economies today. We use a series of simple models to study several aspects of the partnership's choice of capital structure. We show that common features of partnerships reflect the difficulty of raising capital for ventures whose prospects are hard to judge. We also consider the implications of a rule in partnership law that prevents limited partners from playing a role in management, and the implications of the partnership form for projects subject to hold-up.¹

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¹ Some of the empirical material here comes from Guinnane's project with Ron Harris, Naomi Lamoreaux, Jean-Laurent Rosenthal; see Guinnane et al. (2007). The Spanish data reflect Guinnane's joint work with Susana Martínez Rodríguez; see Guinnane and Martínez Rodríguez (2014). We thank her for allowing us to use it here. We appreciate extensive discussions with these authors, as well as Seven Ağır, Shameel Ahmad, Cihan Artunç, Amanda Gregg, William English, Richard Grossman, Philip Hoffman, Matt Jaremski, Steven Nafziger, Tom Nicholas, Larry Samuelson, Veronica Aoki Santarosa, Francesca Trivellato, and Christopher Udry.

1 Introduction

A rich empirical and theoretical literature in economics and finance studies the corporation's capital structure: what kinds of equity and debt claims it issues, why the mix of those claims differs for different firms and in different environments, and how that capital structure both influences and reflects the enterprise's governance. Aspects of that literature are quite general, but most contributions make a number of assumptions that limit the scope of analysis to corporations, even to public corporations.

Many firms today are not corporations, however, and corporations played little role in the historical development of the economies that are wealthy today. Britain's Industrial Revolution, for example, took place in an era when forming a corporation was for legal reasons extremely difficult. There were almost no industrial corporations in Britain during this period. The Continental economies began to industrialize later. During the early stages of their industrialization, these countries also authorized few corporations outside quasi-utility sectors such as railroads. Only in the United States do we see significant numbers of corporations, especially in industrial sectors, before the mid-nineteenth century. Even when governments expanded access to the corporation, many firms organized using a different legal form. The corporation was neither necessary for industrialization nor the preferred enterprise form for all firms.

The corporation represents just one of the enterprise forms a firm could choose. Table 1 presents some of the dimensions along which a business enterprise can be formed, along with sub-sets of the legal variations for each. Even this abbreviated list suggests over a hundred possible ways to organize a firm, only one of which looks like the modern corporation. The entrepreneur's choice from the set of enterprise forms sheds light on the information problems firms struggle with.

This paper extends the analysis of capital-structure and related decisions to multi-owner firms that are not corporations. We call these firms, somewhat loosely, "partnerships." Firms typically organize as partnerships today in limited, specific contexts, often when human capital is the most important asset. As we show below, however, historically partnerships dominated the ranks of firms in most sectors, including manufacturing and commercial enterprises.

Using models that are not themselves novel, we consider the problem of a capital-constrained entrepreneur in an environment of asymmetric information. The models we develop represent current ideas about information and incentives in the economics literature. Each model has some parallel to theoretical approaches in corporate finance. Our contribution is two-fold. First, we consider firms for which the information and incentive problems differ from the typical corporation's because of the firm's size and the context in which it operates. Second, the corporate-finance literature contemplates a given enterprise making choices about what types of equity and debt claims to issue. For the firms we study, decisions about equity and debt

represent not just financing decisions, but choices over the legal form of enterprise. If a partnership wanted to issue limited-liability equity claims, for example, it had to change to a different partnership form operating under different rules.

Our approach differs from the standard treatment of the firm in the corporate-finance literature in two important ways.² First, we assume the entrepreneur may be risk-averse and can invest a significant proportion of his wealth in the enterprise. This assumption has no real counterpart in most corporate finance research; there, the firm may have block shareholders, but those block shareholders are viewed as either risk-neutral or well-diversified. Second, we consider an information environment where a group of individuals may be better-informed than “the market” concerning the firm’s prospects. That is, we consider social ties within a business community or even social group as part of the environment relevant to the capital-structure decision. The corporate-finance literature does not contemplate this kind of social environment. Our analysis also respects the constraints put on capital-structure choices by the legal rules governing companies. Most importantly, we do not assume the separation of ownership and control that motivates many questions in the corporate-governance literature.³

We first outline the main legal differences across the several enterprise forms and present evidence on the historical and present-day ubiquity of non-corporate forms. We then model several issues concerning a partnership’s capital structure. Throughout, we contemplate an entrepreneur starting a firm. Therefore, creditors cannot use past successes and failures to judge the enterprise’s success probability. This entrepreneur has the power to make all capital structure decisions, subject only to the constraints implied by the law and other agents’ incentives. We focus on enterprises that have capital needs beyond the scope of their founder’s wealth.⁴ We consider five questions:

First, many entrepreneurs invest a significant fraction of their own wealth in their firm, even in environments where diversification is easy. Why? We show that by investing heavily in their own firm, entrepreneurs can signal their “type” to other investors (both equity and credit).

Second, outside equity investors in small firms often come from a restricted social circle. Many are family members. This fact implies that peer groups forgo opportunities to diversify, and is puzzling because one would assume the cost of capital would fall with the size of the group of potential investors. This consideration is a key reason for the public corporation. We show this fact may reflect the difficulty of signaling quality to uninformed investors when the entrepreneurs have too little wealth to serve this purpose (as in the first model). By taking on partners who are known to have better signals, the entrepreneur both

²We discuss some exceptions below.

³The focus on corporations in the finance literature has a counterpart in the economic history literature, which tends to accept Chandler’s (1977) stress on the corporation as central to economic development, especially in the late nineteenth century.

⁴There may be an additional set of incentive problems on the real side between a firm and its upstream and downstream business partners. These issues are not the focus of this paper.

acquires more equity and reassures the uninformed capital market about his project.

Third, partners often do not at first pay in the capital they have committed to the firm. This “unpaid” (or “uncalled”) capital can be a feature of limited partnership investments, and is implicit in any unlimited-liability ownership stake.⁵ We consider this feature in two ways. Unpaid capital can obviate *ex post* verification problems for other equity owners; the entrepreneur has less incentive to “run away.” Similarly, unpaid capital addresses both adverse-selection and moral-hazard problems in credit markets, allowing one or more owners to implicitly pledge collateral without liquidating other investments.

Fourth, in many jurisdictions, a partner can be “ordinary” and bear full unlimited liability for the firm’s obligations, or invest as a “limited” partner, who cannot lose more than he invested in the firm. Ordinary partners help run the enterprise, while limited partners usually cannot participate in management. We ask when the entrepreneur takes on an ordinary partner versus when the firm expands by taking a limited partner, focusing on a tradeoff: a sufficiently high-quality ordinary partner helps improve firm decisions. But if there are important information asymmetries across partners, an ordinary partner can introduce moral-hazard problems, and the firm does better with the passive capital contributed by a limited partner.

Finally, we shift to a different aspect of capital structure: whether it is locked into the enterprise in question. Partnerships are effectively at-will, meaning that an owner can threaten to withdraw his capital as a way of forcing renegotiation of profit allocations. This hold-up problem does not exist in corporations and similar legal forms where capital, once paid in, cannot be withdrawn. We show that the avoidance of hold-up can be a significant reason to shift away from a partnership form.

There are many other differences between corporations and other business forms. In this paper, we abstract away from two especially important issues. First, tax rules today sometimes make partnership forms attractive because they reduce or obviate the problem of double taxation of enterprise income and the investor’s personal income. Second, partnerships can have trouble binding the firm *qua* firm. If the firm itself cannot contract with others, the partners have to sign all contracts individually, or use other law to give one individual power to sign on their behalf. The severity of these problems depends heavily on the specific legal environment. Both issues doubtlessly affect the choice of enterprise form, but to maintain focus on capital structure we set them aside.⁶

⁵Corporations in some times and places also have unpaid capital; see the discussion in Section 4.3.

⁶See Guinnane et al. (2007) for more on the issues mentioned here. Most jurisdictions did not impose significant taxes on business firms until World War I or later, and those that did attempted to avoid taxing the same revenue streams twice. The problems of binding a partnership as an entity depends on specific legal rules. The U.K. and the United States treated partnerships as contracts among individuals, and in those countries the problem was acute. The French *Code de Commerce* (1808, §22) made all owners of the *Société en nom collectif* responsible for the firm’s obligations, even if contracted by a single owner. Continental business-registry systems such as those established in Germany give partnerships something closer to the status of the entity; a partnership registered under the business law can ordinarily make legally binding contracts as a firm. See Guinnane (2017). Hansmann et al. (2006) stress a different issue. Limited liability protects an investor’s assets from the firm’s creditors. What they call “entity shielding” protects the firm’s assets from claims against the assets of the firm’s owners. We assume all the firms we consider enjoyed entity shielding in that sense.

Our models draw on standard arguments in the economics of incentives and information. Only the focus is new; the question we pose has attracted little attention from economists. The few treatments of enterprise form in the economics literature focus on narrower questions. The most recent discussions of partnerships focus on human rather than physical capital. Both Levin and Tadelis (2005) and, more recently, Kaya and Vereshchagina (2014) find that partnerships represent the best organization for skill-intensive team production. In their models, partnerships have a role in professional services and similar activities only.⁷ In contrast, we demonstrate important reasons for the ubiquity of partnerships outside these sectors. Cai (2003) studies a general problem of two parties making investments to achieve a common end. The investments can be general or specific, and they might be complements or substitutes. Cai considers a full range of outcomes, showing conditions under which joint asset ownership is optimal. His joint asset structure captures some aspects of the partnership. Spulber (2009)'s more general model focuses on consumer-entrepreneurs in a general equilibrium setting. Spulber derives the choice of sole proprietorship, partnership, or corporation endogenously, and thus deals with questions closer to those of this paper. Given his goals, he is forced to abstract from important specific features of partnerships and closely-related forms that we study in depth.

Most of our discussion is theoretical and thus not tied to any particular time or place. We focus on the menu of choices available for the later nineteenth and early twentieth century, however, to take advantage of two features of the period. First, we can abstract from a number of legal and regulatory features of later periods, allowing us to achieve a tighter focus (one example would be the tax issue mentioned above). Second, this period offers unusual access to counts of firms taking the different forms. Our empirical discussion draws heavily on five countries: France, Germany, Spain, the United States and the United Kingdom. Four of these countries (Spain is the exception) counted among the leading industrial societies of their age, so the rules we are dealing with were not those of a stagnant, backward economy. Because of related projects, we have developed extensive databases for firms in these countries in this period, allowing a better match between theory and evidence. The decisions we model have close analogues both earlier and later. The legal structure we assume was first codified in the French *Code de Commerce* of 1808, but the Code largely formalized earlier rulings, so much of what we say is relevant for earlier periods. By the twentieth century, the proliferation of enterprise forms and efforts to tax businesses as entities adds new considerations to the decisions we contemplate. But even today, entrepreneurs forming a new business face some version of the decisions we model.

⁷Similarly, Morrison and Wilhelm (2008) focus on the formation of human capital in investment-banking partnerships, while Morrison and Wilhelm (2004) discuss general theoretical problems in the passing on of human capital. None of them apply to the present case, which focuses on the financial capital issues encountered by the first-generation entrepreneur.

2 Enterprise forms

The public corporation contemplated in most of the corporate-finance literature can issue a wide variety of equity and credit claims without fundamentally altering the firm. Partnership forms are different: legal rules constrain the types of claims an extant enterprise form can issue. For some purposes, issuing a new type of claim requires winding up the firm and re-forming it as something else. Corporations can and do agree to specific covenants when issuing particular claims. But this is contractual, and not inherent in the corporation's structure. Partnership rules tie specific types of equity claims to governance rules in ways inherent to the form.

2.1 The legal rules

The legal rules governing enterprise forms differ across time and space, but they exhibit commonalities that justify the stylized characterizations used here. Most of the European Continent drew heavily on the *Code de Commerce*, and the approach embodied in that law survives in Europe today. Enterprise law differed in important respects in the United Kingdom and the United States, and in England's other former colonies.⁸ Table 2 summarizes the main rules pertaining to the enterprise forms available in the late nineteenth and early twentieth century. An entrepreneur establishing a multi-owner firm had two basic options, the partnership or the corporation. There were two types of partnership. In an ordinary partnership, all owners bore unlimited liability for the firm's debts, and all owners could participate in running the enterprise. A limited partnership had general partners who ran the firm and bore unlimited liability for the firm's debts, as well as limited partners who could not participate in management but whose losses were limited to the amount of their investment.⁹

Partnership law allowed owners to contract flexibly on investment, cash-flow and control rights. In the United Kingdom and the United States, partnerships were private contracts. Some Continental countries established a business registry that gave enrolled partnerships extra privileges. There were effectively no restrictions on the formation of partnerships.

Each corporation at first required specific permission from the State. Firms given the right to incorporate could be required to share some of the benefits of incorporation with the State via free equity stakes, investment in favored projects, etc. The Bank of England (1694), for example, received a corporate charter and a monopoly on corporate banknote issue in return for assistance with financing government debt. This

⁸La Porta et al. (1998) stress the commonality of law within legal families they define as "common law" and "civil law." Nothing in this paper relies on this distinction.

⁹The rule against a limited partner's participation in management differed slightly across jurisdictions. The 2001 amendments to the U.S. Uniform Partnership Act dealt away with the requirement that any partner have unlimited liability. Thus in states that adopt the UPA, limited partnerships today do not have an unlimited partner.

“concession system” gave way to a system of “general incorporation” that allowed any group of entrepreneurs to create a new corporation as long as the firm adhered to specific norms. The norms could be severe: partly to protect the public, most countries imposed publicity, minimum capitalization, and other requirements.

General incorporation came to Britain in 1844, but did not reach France until 1867, most of Germany until 1870, and other European countries even later. Most scholars date the British Industrial Revolution to the period 1760-1820. Harris (2000, Table 8.4) estimates that a total of 720 corporations were known to London equity markets in 1843. Of these, most were banks or insurance companies, or a utility such as a gas company, railroad, or canal. Only a handful of the manufacturing firms that were central to industrialization organized as corporations. Thus the corporation played little direct role in Britain’s industrial transition. The U.S. had a distinctly different experience from which one cannot generalize. Several U.S. states introduced general incorporation for manufacturing firms before Britain’s 1844 Act, and nearly all U.S. states allowed more liberal access to the corporate form than was found outside of Britain.¹⁰

Starting at the end of the nineteenth century several countries introduced another legal form that has some characteristics of the partnership and some characteristics of the corporation. These enterprise forms, including the German *Gesellschaft mit beschränkter Haftung* (GmbH, 1892) and the British Private Limited Company (PLC, 1907), allow all owners to have limited liability and to participate in management. The new forms also lock in capital. (They differ from partnerships and corporations, and from each other, in other ways that we have deferred to later analysis.) Guinnane et al. (2007) call these enterprises, collectively, “Private Limited-liability Companies” or PLLCs. The modern U.S. limited-liability company (LLC) is similar, for our purposes, to these PLLCs.¹¹

We stress two other, related aspects of equity investment. One is ownership with unlimited liability. Most

¹⁰There were alternatives to a corporate concession that lie beyond the scope of our analysis. In some countries, limited partnerships created limited partner shares that traded much like corporate equity. Because these firms were partnerships, they did not require a concession (and at least one owner still had unlimited liability). The practice was rare outside France. In England the Bubble Act (1720) forbade the creation of corporations without a royal concession. In the years following, some English firms adopted an unincorporated joint-stock form that partially substituted for corporations. For the English law and its development, see Harris (1997, 2000). Freeman (2011) study unincorporated joint-stock companies between the Bubble Act and the advent of general incorporation. Hilt (2017) notes that many U.S. states that did not have general incorporation made the concession system so routine as to approximate general incorporation. New York introduced the first U.S. general incorporation statute in 1811. Pennsylvania enacted a similar law in 1836. A few early enactors such as Ohio and New Jersey repealed their statutes but put them back in force later. The Prussian Act of 1843 standardized the corporate form and made it easier for entrepreneurs to anticipate which ventures would receive royal favor, but did not lead to a dramatic increase in numbers of corporations formed. See Guinnane (2017b).

¹¹The French SARL (*Société à responsabilité limitée*), introduced in 1925, owes much to the GmbH. The British Private Limited Company (1907) reflects a modification of the 1862 Companies Act for smaller firms that did not want to list shares on markets. The Spanish SRL (*Sociedad de responsabilidad limitada*) dates to 1919 and owes something to both the PLC and the GmbH. See Guinnane (2018) for the political economy of the GmbH’s creation, and Martínez Rodríguez (2016) for an account of the SRL. The ability to create hybrids by combining forms creates flexibility we assume away here. The most common hybrid inserts a legal person (usually a PLLC) as the general partner in a limited partnership. Typically the limited partners and the PLLC’s owners are the same individuals. This arrangement allows the firm to assign profits to the limited partnership shares (and thus escape enterprise taxes), and overcome any restriction on the limited partners running the firm. The extremely popular German GmbH & Co KG, a limited partnership in which a GmbH serves as general partner, is an example of this arrangement. A growing literature studies the determinants of the choice of legal form. Contributions include Musacchio and Gómez-Galvarriato (2004) and Musacchio et al (2008) on Mexico; Abramitsky et al (2010) on Brazil; and Hilt and O’Banion (2009) on New York State.

corporate equity shares today carry limited liability, and this was an almost-universal feature of corporate shares from the first days of general incorporation.¹² A general partner under the relevant partnership rules contributes a fixed, contractually-specified sum to the firm’s operating capital, but if the firm fails, the owner can be held liable for additional sums up to the value of all he owns.¹³ A second common investment form was an equity stake with limited liability but also some unpaid capital. An owner might agree to a limited £100 investment but only pay in £30 in capital. The partner would receive dividends reckoned on what he paid in (£30), and the remaining £70 would matter in two different ways. First, the firm could “call” some or all of the additional capital – that is, demand that the partner(s) pay in more of the outstanding sum. Second, the £70 allowed the firm to offer creditors more in security than it actually worked with on a day-to-day basis.

2.2 Prevalence and survival of non-corporate forms

These alternatives to corporations were quantitatively important. Table 2 reports the distribution of new enterprises by legal form for France, Germany, and Spain for selected years in the period 1887-1932.¹⁴ Overall, partnerships dominate the corporation until the PLLC’s introduction. As late as 1890, long after the introduction of general incorporation in all three countries, some three-quarters of new firms organized as an ordinary partnership. The legal rules for partnerships were similar in these three civil-law countries. The cross-country variation in the role of the corporation reflects, largely, specific rules about the corporation in each country. The 1884 corporation reform in Germany reduced the corporation’s attractiveness for smaller firms by requiring costly formation and governance mechanisms. Spain, on other hand, afforded remarkable flexibility to its corporation, making the form relatively easy to tailor to smaller enterprises. The new forms displace both partnerships and corporations, although the PLLC’s precise impact on the older forms differs across countries (Guinnane et al. 2007). Some of these differences reflect variations in the corporation, while others reflect the specific features of the national PLLC and the degree to which it offered entrepreneurs new organizational possibilities (Guinnane and Rosenthal 2014).¹⁵

¹²Britain’s first (1844) general incorporation Act required unlimited liability; the 1855 Act allowed general incorporation for enterprises with limited liability.

¹³In theory a partner with unlimited liability can limit his liability for specific obligations contractually, by agreement with a creditor. We see no systematic evidence this occurred in the period we contemplate. Such contracting would be impractical for the informal, short-term trade credit emphasized in the literature, and would be impossible as a limitation on tort liability. Posner (2007, p.422) notes that negotiated limited liability entails considerable transactions costs: "In principle, the enterprise could include in all its contracts with customers and suppliers a clause limiting its liability to the assets of the enterprise. But the negotiation of such waivers would be costly. And it would be utterly impractical to limit most tort liability in this way." Moreover, creditors might want the firm’s owners to have unlimited liability in lieu of contracting on specific assets as collateral. More commonly one sees the reverse: the owners with limited liability (such as in a PLLC) waiving the limitation to secure credit for the firm.

¹⁴The U.K. and the United States did not require registration of partnerships, so analogous data are not available for those countries.

¹⁵Guinnane and Martínez Rodríguez (2018) use unusual Spanish data to estimate discrete-choice models for the enterprise form in Spain between 1886 and 1935. Spain’s SRL was a stronger substitute for the partnership than for corporations; these

One could reasonably object that these figures all pertain to the creation of new firms, and do not weight by their lifespan or size. Corporations lasted longer and had greater capitalization than other forms. In addition, corporations were much larger than both partnerships and PLLCs. Thus registration numbers understate the weight of corporations among operating enterprises. Guinnane and Martínez Rodríguez (2014), for example, report that corporations accounted for about 90 percent of all investment in new firms prior to the PLLC's introduction in that country. Another way to ask whether partnerships were more or less important than their weight in all new firms would suggest is to ask whether they were limited to specific areas of the economy. The answer is no. Figure 2 draw on the unusual German census of firms to show that the partnership forms and the GmbH (the German PLLC) appeared across the spectrum of economic activities.¹⁶ Even in sectors characterized by large firms with substantial fixed capital investment, we find the GmbH and, more surprisingly, the partnerships. Standard industrial classifications can mislead by allocating a small firm serving the steel industry to a sector consisting primarily of quite different firms. This is not what Figure 2 shows, however. Kocka (1982, Table 2) reports that GmbHs accounted for five of the 100 largest German industrial firms in 1907. Two were steel firms and one was in the chemical industry. Another seven of these 100 largest industrial firms were partnerships, including two more steel firms as well as two in the machinery sector.

Corporations account for nearly all of the largest enterprises operating today, but many firms retain a different organization. Germany in 2014 had only 8,037 corporations in all, out of a total of about 1.03 million multi-owner firms. Far more numerous than corporations were ordinary partnerships (275 thousand), limited partnerships (150 thousand), and GmbHs (about 526 thousand). Corporate revenues exceeded that of firms organized in other ways, of course; 91 percent of corporations paid tax on at least 250 million Euros income in 2014. But the other forms included some of the largest firms – 28 percent of partnerships, 44 percent of limited partnerships, and 40 percent of GmbHs fell into this top tax category. The United States, as one might expect, has relatively more corporations. In 1997, U.S. entrepreneurs ran about 1.8 million partnerships compared to 4.7 million corporations. Some 2.4 million of the corporations fell into the “S corporation” category that offers lower tax payments for smaller firms. Even if we ignore the smaller “S” corporations, there were about 1.3 non-S corporations for every partnership, and 2.7 corporations per partnership overall. Germany, on the other hand, had about 1 corporation for every 80 partnerships.¹⁷

trade-offs reflect specifics of each form's rules.

¹⁶Figure 2 omits firms organized using a special mining form that was more similar to the GmbH than to the corporation, the *bergrechtliche Gewerkschaft*. In principle all firms using this form had to be mines, although in the years prior to the GmbH some firms apparently pretended to be mines to escape the more stringent rules of the standard corporate form. In some Continental countries, cooperatives often substituted for for-profit enterprises organized under a different legal form. See Guinnane (2017b).

¹⁷The German data refer to firms paying the *Umsatzsteuer* in 2014. See *Statistisches Jahrbuch für die Bundesrepublik Deutschland* 2014, 9.13.1, P. 276. Partnerships in the German data combine the firms organized under the commercial and civil codes. U.S. data for 1997 from the Historical Statistics of the United States Table Ch1-18, p.3-498. Hannah (2015) reports

The corporation plays a central role in many modern economies, and occupies a privileged place in business-history accounts such as Chandler (1997). As we demonstrated, this does not mean other enterprise forms were quantitatively unimportant. Nor does it mean the corporation dominates everywhere. Perhaps more importantly, partnerships and PLLC forms play a role in the life-cycle of many enterprises that eventually become corporations. Some firms start life as corporations, but many corporations reflect the transformation of one or more earlier businesses into a new form. Business histories show that many nineteenth-century corporations went through many different partnership arrangements before their sometimes reluctant adoption of the corporate form. The partnership often represents the start of a corporation.

3 Extending the corporate-finance literature

All firms, including those organized as partnerships, face the fundamental information and incentive problems at the heart of the corporate-finance literature. Our analysis treats these problems differently for two reasons. First, the legal rules for partnerships and other small firms constrain enterprises in ways not true of corporations. The reverse is also true. Second, the context in which our firms operate mean that the problems appear in different guises; a partnership, for example, rarely has more than a few owners, while a public corporation can have many thousands.

Modern corporate finance originated with Berle and Means (1932), who assume an enterprise whose small, dispersed owners are not its managers and managers who have at most small stakes in the firm they run. This assumption sets the stage for a long line of work that deals in one way or another with the implications of less-than-perfectly aligned interests of managers and owners. Grossman and Hart (1982) for instance focus on the disciplining effect bankruptcy may have on managing agents in a widely held corporation, and the resulting incentive for managers to take on debt as a signaling device. One can think of the related corporate-governance literature (as do Shleifer et al. (1997)) as dealing with the problem of the firm's finance providers assuring a return to their investments. More recent contributions deviate from these assumptions in three important ways. Leland and Pyle (1977) consider entrepreneurs who invest in the firm they intend to run. A second strand of the literature demonstrates that many firms have large blockholders whose incentives to monitor the managers reduce the agency problems Berle and Means stress. These blockholders, of course, raise the issue of agency problems among different types of owners (Myers and Majluf (1984)). Contrary to Berle and Mean's notion of dispersed shareholders, the empirical literature underscores the role of networks of owners, the family group being perhaps the most important example (for example, La Porta et al. (1999) and Faccio and Lang (2002); Bertrand and Schoar (2006), Mullins and Schoar (2016)).

much higher numbers of corporations for Germany (and other countries) because he combines corporations *per se* (the German *Aktiengesellschaft*) with PLLCs (the German GmbH).

These core theoretical issues remain our concern, but they appear in different ways for the firms we consider. Corporations of course can have a small number of owners, and can restrict the transfer of shares in various ways. But the firms we contemplate are extremes in both dimensions. There was virtually no market for equity in partnerships. Changing partners requires in most cases winding-up one firm and creating another. PLLCs could not list their shares on exchanges, although in principle their owners could sell their equity. (Many firms organized this way also contractually restricted the sale of shares by, for example, requiring an owner to offer the shares to current owners before selling to an outsider.) The firms we have in mind typically have a small number of owners, one or more of whom may also manage the firm. In many corporations, dispersed ownership creates collective-action problems among shareholders that can frustrate efforts to assert influence on the managers. Most partnerships and PLLCs had only a few owners. Rosenthal and Lamoreaux (2005, Table 2) report that seventy-one percent of new firms had only two partners in France in the period 1832-1843. In the period 1885-1936, sixty-two percent of new Spanish ordinary partnerships had two owners. Only eight percent had more than four owners. Spanish PLLCs (1920-1936) were only slightly larger, with thirteen percent having more than four owners. Legal rules allowed the owners of such firms to craft highly firm- and owner-specific governance rules, making it possible for a single, even minority owner to have veto power over specific decisions. Other, more common rules forbade the firm from taking certain actions (such as borrowing) without permission from a given set of owners. These rules of course can be mimicked to some extent in a corporate setting with multiple share classes and other complex voting-rights schemes. In a small firm that is established with specific owners in mind, the rules can be crafted very specifically.

Second, following the seminal contribution by Jensen and Meckling (1976), "capital structure" in the corporate finance literature primarily means the choice between equity and debt, even when extended to different types of equity. The firms we study also face trade-offs between equity and debt, but in a different way. Historical firms made much more use of financing approaches that receive less attention in the corporate-finance literature because they play a comparatively minor role in the modern corporation. Capital can be locked-in; equity partners can be given managing rights; capital may be pledged but unpaid. These choices create bundles of rules not usually contemplated by the corporate finance literature that, however, allow small enterprises to solve the relevant information problems in ways that the standard equity-debt choice may not.

The corporate-finance (and accounting) literatures sometimes stress the importance of reporting rules and, in general, how transparent the corporation is with its owners. Restricting important information can allow managers to abuse owners. The legal rules for partnerships generally provide for complete access to the firm's ledgers for general partners and for the owners of PLLCs. (Limited partners may be more restricted).

Historically, mandatory disclosure rules arise in the context of regulating and reforming corporation law. Issues pertaining to managerial compensation and entrenchment have a parallel in our context, but again, there are important differences. Partners often worked for their firm, and there were doubtless questions of an owner’s salary versus that same owner’s return on his investment. But the setting rules out many of the questions that have arisen in connection with corporate managerial compensation. For example, our owners have little reason to inflate earnings to drive up the value of their equity; even if they could do so, there is essentially no market for their equity investment.¹⁸

4 Capital structure for the partnership

This section uses five different, simple models to address the five questions outlined in the introduction. Each model presumes an entrepreneur with fixed wealth, someone empowered to make all of the firm’s capitalization decisions. We assume the firm has given capitalization needs and seeks the best way to provide those needs. Each model makes different informational and solution assumptions, to suit the question. We adapt models developed in other contexts to understand the particular problems of the partnership’s capital structure.

4.1 The entrepreneur’s capital investment: why not diversify?

We begin by asking why an entrepreneur invests a large fraction of his personal wealth in the firm. This arrangement is the heart of the ordinary partnership. We observe this pattern even when diversification is simple. The historical data available to us does not allow us to see how much of a person’s total wealth is invested in a firm, but we can compare partnership investments to average per-capita income in some contexts.¹⁹ The observation is all the more puzzling when we note that many entrepreneurs also work for the firm: they are risking both assets and labor income.

We argue that by pledging his assets instead of diversifying, the entrepreneur can demonstrate his “type” to investors.²⁰ This holds true for both single-owner firms and partnerships. Our models assume a set of

¹⁸Ordinarily partnerships and PLLCs are free to publicize financial results only to the extent they choose; public reporting requirements pertain only to corporations or to enterprises that list bonds on public markets. Baskin (1997) traces financial reporting in the United States to the Interstate Commerce Commission’s efforts (1887) to force railroads to use standard reporting rules. Vigorous financial reporting was a central part of the reforms reflected in the German Corporation Act of 1884, but this was an exception at the time, and the reporting was intended to benefit shareholders rather than a broader public. The English Companies Act (1862) requires statements for stockholders, but does so in a set of default rules (Guinnane, Harris, and Lamoreaux (2017)). Companies can (and did) decline to provide stockholders with information on the firm’s condition. See Guinnane et al. (2017).

¹⁹Spanish GDP per capita in 1900 was about 805 (1900) pesetas. The median capitalization per partner in an ordinary Spanish partnership in that year was about 2900 pesetas.

²⁰Our model differs from Leland and Pyle (1977) in that we focus on poorer entrepreneurs who cannot borrow endlessly at a risk-free rate. Amit et al. (1990) consider a similar problem but stress the lender’s returns.

financiers who provide either equity or loan capital for the firm. For the smaller enterprises we contemplate, the credit market took the form of trade credit, raw materials and other inputs provided on terms.²¹

We start with a risk-averse entrepreneur i with wealth $w_i < 1$ and concave utility function $u(\cdot)$. Entrepreneurs come in types that determine the probability that their firm succeeds. We assume $p_i \in \{p_L, p_H\}$ is the probability that the firm succeeds, where $0 < p_L < p_H < 1$. The firm requires an upfront investment of one unit of capital. When successful, the firm pays out $\pi_i > 1$. If it fails, the project pays out nothing.

The entrepreneur decides what fraction $0 \leq s_i \leq 1$ of his wealth w_i to invest in his enterprise, and then approaches financiers for the remainder. The financiers observe s_i , but not the entrepreneur's type.²² We assume interesting projects are scarce relative to the amount of financing available (or alternatively, that financiers are engaged in Bertrand competition), which imposes a zero-profit condition on the financiers. Financiers have access to a risk-free investment that returns r_0 with certainty.²³

The game has two types of equilibria. Entrepreneurs may “pool”, meaning that the financiers treat all entrepreneurs the same. We present an example of a pooling equilibrium in the appendix. We stress the more interesting separating equilibria, which allow the entrepreneur to distinguish himself from others by risking his own assets. Let $s_i(p_L) = 0$, $s_i(p_H) = s^* > 0$. The threshold value s^* is the smallest s that is unattractive to entrepreneurs of the low type. Let the equilibrium beliefs be $P(p_i = p_L \mid s_i = s^*) = 0$ and $P(p_i = p_L \mid s_i \neq s^*) = 1$. These beliefs hold true for $s_i = s^*$ and $s_i = 0$, and are off-path anywhere else. The financiers offer rates that, given their beliefs, allow them just to break even:

$$p_L r_{s_i \neq s^*} + (1 - p_L)(-1) = 0 \quad (1)$$

$$p_H r_{s^*}(1 - s^*) + (1 - p_H)(s^* - 1) = 0 \quad (2)$$

The individual rationality (IR) and incentive compatibility (IC) constraints for the two types are:

$$p_H u(\pi - (1 - s^* w) r_{s^*} + (1 - s^*) w) + (1 - p_H) u((1 - s^*) w) \geq 0 \quad (3)$$

²¹For our purposes, the relevant credit is loans to the firm. Sometimes these were formalized by credit instruments such as bills of exchange. Often, but not always, these notes were secured by the goods underlying a specific transaction; for example, if a spinning factory sold yarn to a weaver, the yarn would be the security for the obligation. Holders of these notes could sell them (“discount”) to banks, in effect taking a short-term loan secured by the note. Lamoreaux (1994) describes the use of note discounting in New England banks in the mid-nineteenth century. Tilly (1966) focuses on the Rheinland in a similar period. Bodenhorn (2007) discusses bills of exchange as the primary lending mechanism for a nineteenth-century New York bank. The bills of exchange probably reflect relatively large loans. Kent (1994, p.58) describes the marketing practices of manufacturers who sold their goods to retail outfits on credit without such formalities. A different historical literature stresses the practice of retailers selling goods on credit. Of course, if a tailor or a grocer had to provide credit to make sales, that might increase his need for credit from suppliers. Kent (1994) notes that many distressed retailers were themselves owed considerable sums by customers. Johnson (1993) emphasizes the role of credit in retail trade. See also Finn (2016).

²²It may seem unrealistic that the financier observes the *share* of wealth invested. However, in environments where the entrepreneur's wealth is known (or where wealth is relatively constant across the population of entrepreneurs) knowing the share invested is equivalent to knowing the amount invested. A similar argument holds with CRRA utility.

²³In what follows we set $r_0 = 0$ for convenience.

$$p_L u(\pi - r_{s_i \neq s^*} + w) + (1 - p_L)u(w) \geq 0 \quad (4)$$

$$\begin{aligned} & p_H u(\pi - (1 - s^* w) r_{s^*} + (1 - s^*) w) + (1 - p_H)u((1 - s^*)w) \\ & \geq p_H u(\pi - r_{s_i \neq s^*} + w) + (1 - p_H)u(w) \end{aligned} \quad (5)$$

$$\begin{aligned} & p_L u(\pi - r_{s_i \neq s^*} + w) + (1 - p_L)u(w) \\ & \geq p_L u(\pi - (1 - s^* w) r_{s^*} + (1 - s^*) w) + (1 - p_L)u((1 - s^*)w) \end{aligned} \quad (6)$$

If these conditions hold (and it is easy to give simple parametric examples where they do), then the model has a separating equilibrium for this and, often, for other values of s . All separating equilibria satisfy the Spence-Mirrlees condition: low-quality entrepreneurs cannot mimic high-quality entrepreneurs. The various separating equilibria differ only in the interest rate charged and thus the division of surplus.

The separating equilibrium offers a simple explanation for why we see entrepreneurs investing their own wealth in their venture instead of diversifying.²⁴ By taking on more liability, (rich) investors credibly signal their type to financiers and therefore receive cheaper financing. Spulber (2009, Chapter 7) uses a moral-hazard approach, instead of the adverse-selection model we present. But his result has the same flavor; wealthy entrepreneurs can better obtain financing, in his model, because risking their own wealth disciplines their conduct. Another strand in this literature assumes a risk-averse entrepreneur and studies how moral hazard affects project selection (Lambert (1986)). With a risk-averse entrepreneur and moral hazard, project type selection can also be skewed.

This model shows that the entrepreneur can use his wealth w_i to signal his type. But not all entrepreneurs have the financial means to engage in this form of signaling.²⁵ To the extent that some high-type entrepreneurs lack the assets necessary to show their commitment to their firm, there may be good ideas that go unexploited. The next model considers a way for poorer investors to circumvent this problem.

4.2 Why have partners instead of hands-off investors?

In section 4.1 we contemplate an entrepreneur who has to convince uninformed creditors of his type. Many firms consist of investors drawn from a small social circle. The “small circle” takes several forms. The economics literature has shown considerable interest in the general phenomena of trade and other economic activity occurring within tightly-defined, often diaspora, social groups. Greif’s (1991, 1993) account of the

²⁴The fraction of wealth an entrepreneur invests signals his confidence in his own firm. For sufficiently small p_L , this result holds even for risk-neutral entrepreneurs. However, the entrepreneur’s risk aversion amplifies the conclusion.

²⁵Our entrepreneur invests a share of his wealth; Belenzon et al. (2017) explore the use of eponymy as another way to signal entrepreneur quality, in this case via reputational costs for the entrepreneur. In the tight social settings that we contemplate, the entrepreneur is automatically associated with his enterprise.

Maghribi traders focuses on a relatively small, closed social group that shares an ethno-religious identity. Trivellato (2009) stresses kin alliances within Livorno’s Sephardic community. More generally, family members often provide investments to firms. Marrying a wealthy woman to obtain a dowry is one version of the practice.²⁶ Ben-Porath’s (1980) seminal discussion of the “F connection” stresses that family members know more about one another than do strangers. Hilt and O’Banion (2009, Table 6) report for New York State in 1853 that about 54 percent of ordinary partnerships included at least two close relatives. About forty percent of ordinary partnerships formed in Spain in the period 1886-1936 had some owners who were close relatives. Family members comprised the entire partnership in more than one-quarter of firms. In Egypt in the period 1910-1949, about twenty-eight percent of all new general partnerships included related owners (Artunç 2018).²⁷ This common pattern seems natural. But it should surprise: if family members informally share risk, they should be diversifying their activities instead of relying on the the same enterprise.

Tight social connections can affect the organization of firms in several ways. We stress the implications for the entrepreneur’s ability to attract investment. Assume that the entrepreneur knows people who have some individual wealth, and who are known to have private signals about his quality. These potential partners may be better-informed about the entrepreneur because of specialized knowledge about an industry, because of where they live, or because they know the entrepreneur personally. In the interest of comparability, we keep assumptions and notation as close as possible to those used in section 4.1. The entrepreneurs are risk-neutral, have wealth w_i and a given ability $p_i \in \{p_L, p_H\}$, $0 < p_L < p_H < 1$, that denotes the likelihood of their project succeeding. These projects again require a fixed investment of 1 unit of capital and deliver $\pi_i > 1$ in case of success, and zero otherwise. Each entrepreneur i knows one potential partner P_i with wealth W . A potential partner gets a private signal $M \in \{G, B\}$ of the entrepreneur’s ability. These signals are informative in the sense that $P(M = G \mid p = p_H) = P(M = B \mid p = p_L) = q$ where $q > \frac{1}{2}$. To simplify the algebra, in the example below we assume the partner’s utility function is given by $u(c) = \log(c)$.²⁸

The potential partners have the option of joining the firm and adding equity to the entrepreneur’s. The two owners might be able to finance the firm entirely without outside investments. But we focus on the more interesting case where the firm still needs additional finance from the credit market. Any remaining financing comes from loans provided from a pool of uninformed financiers. The financiers have access to safe investments that provide a fixed return r_0 . We assume the partner makes the entrepreneur an offer, based on the private signal; the entrepreneur then decides whether to accept the partnership offer; finally, the

²⁶This practice is almost a trope in the business-history literature. James (2006) provides several examples in the early histories of three important Continental business families.

²⁷“Relatives” here are persons who are named in the firm’s articles of association as husband, wife, sibling, child, etc. Because of Spanish naming practices, this source reveals more relationships than might otherwise be the case (for example, married sisters). However, our estimates of family firms remain a lower bound.

²⁸The conclusions stated in the text hold regardless of the exact form of the utility function. See Appendix section A.2

uninformed financier observes the decisions of the partner and the entrepreneur, and offers the entrepreneur residual financing.

We start with the decision by the potential partners to invest a share s_i in the venture. We verify below that for wealth levels $w_i \leq \bar{w}$, where \bar{w} is some threshold level, entrepreneurs go ahead with the project regardless of whether the success probability is high or low. Thus an entrepreneur with little wealth cannot credibly reveal his “high” type. For poor entrepreneurs the potential partner has to rely entirely on the private signal. For $M = G$, $P(\text{success}) = qp_H + (1 - q)p_L$. Conditional on receiving a good signal, the partner P_i maximizes his expected earnings by investing a share s_G , by solving

$$\begin{aligned} \max_{s_G} & (p_H q + p_L (1 - q)) \cdot \log [\pi \cdot s_G W + (1 + r_0) (1 - s_G) W] \\ & + (1 - p_H q - p_L (1 - q)) \cdot \log [(1 + r_0) (1 - s_G) W] \end{aligned} \quad (7)$$

This yields

$$s_G = \frac{(p_H q + p_L (1 - q)) \pi - (1 + r_0)}{\pi - (1 + r_0)} \quad (8)$$

and similarly, if the signal is bad,

$$s_B = \frac{(p_L q + p_H (1 - q)) \pi - (1 + r_0)}{\pi - (1 + r_0)} \quad (9)$$

For values of $w_i > \bar{w}$, only high-ability entrepreneurs invest. Since potential partner observes the entrepreneur’s wealth, he instead solves

$$\max_s p_H \log (\pi W s + (1 + r_0) (1 - s) W) + (1 - p_H) \log ((1 + r_0) W (1 - s)) \quad (10)$$

so the share of his wealth the partner invests is

$$s_W = \frac{p_H \pi - (1 + r_0)}{\pi - (1 + r_0)} \quad (11)$$

Next, we turn to the entrepreneur’s decision to accept a partner. We assume here (and verify separately) that in equilibrium, the entrepreneur accepts all partnership offers. This means the entrepreneur obtains capital from his partners equal to

$$K_P = s_G W \quad (12)$$

for $w < \bar{w}$ and

$$K_P = s_W W \quad (13)$$

above.

Now consider the potential lender. The entrepreneur faces a funding gap of $1 - w_i - K_P$, which the credit market fills. We assume that the credit provider observes both the entrepreneur's wealth w_i , and the partner's contribution s_i . For entrepreneurs with wealth less than \bar{w} , the credit provider uses Bayes' rule to estimate \hat{p} , the probability that the entrepreneur is of high quality:

$$\hat{p} = q \quad (14)$$

where $\hat{p} = P(p = p_H \mid M = G)$. The financier's zero-profit condition implies a required rate of return of

$$1 + r = \frac{1 + r_0}{qp_H + (1 - q)p_L} \quad (15)$$

For entrepreneurs with wealth above \bar{w} , however, the credit provider knows that the entrepreneur is of the high type, and instead offers credit at interest rate

$$1 + r = \frac{1 + r_0}{p_H} \quad (16)$$

The richer entrepreneur (those with wealth above \bar{w}) receives lower interest-rate offers, due to the lack of uncertainty over his type. Finally, the entrepreneur decides whether to accept the financier's offer. An entrepreneur accepts a credit offer if and only if

$$p_i (\pi (1 - K_P) - (1 + r) (1 - K_P)) - (1 - p_i) w_i \geq 0 \quad (17)$$

That is, whenever

$$p_i \geq \frac{w_i}{\left(\pi (1 - K_P) - \left(1 + \frac{1 + r_0}{q p_H + (1 - q) p_L} \right) (1 - K_P) + w_i \right)} \quad (18)$$

This expression is increasing in w_i , and reduces to the trivial condition $p_i \geq 0$ when $w_i = 0$. For small levels of wealth, the entrepreneur goes ahead with the project no matter how unlikely success is, since his downside risk is very small. For larger values of w_i , however, the inequality in (18) holds for p_H , but not p_L , so that wealthy individuals only become entrepreneurs when their success chances are large.

When entrepreneurs cannot signal quality with their own wealth, they must find other ways to contend with the adverse selection problem. Poor entrepreneurs who have the right connections can do this by letting (positive) private signals substitute for the commitment their own capital implies.²⁹ In the absence

²⁹Even in modern economies, investors may rely on signals from other outside but connected investors. Shane and Cable (2002, p.369) study the tight social networks involved in gathering information prior to investing seed money in contemporary

of informed partners, poor entrepreneurs cannot signal their quality because the financiers know that all poor entrepreneurs will invest, regardless of the project’s quality. The partners play two distinct roles: they supply capital on their own, and they provide information about the entrepreneur to the broader capital market. The model implies that some potential entrepreneurs have high-quality projects but lack either personal wealth or informed potential partners. It follows that some firms are “missing:” some valuable projects cannot be undertaken because of information limitations. The model implies predicts that an industry with relatively high capital requirements or a technology that is new or opaque to potential investors will have many such missing firms. Connected firms are thus a mix of very productive firms that need not rely on inside capital and marginally productive firms that without inside capital would not have been created at all.³⁰

A variant on the limited partnership allowed the passive investor to remain secret. German commercial law (among others) makes a sharp distinction between a limited partner, who was a member of a firm called a limited partnership (*Kommanditgesellschaft*), and a silent partnership (*stille Gesellschaft*, or sG). The limited partnership constitutes a firm. The names and capital contributions of all limited partners appear in the firm’s entry at the commercial registry, which is a public document. Because a silent partnership (sG), on the other hand, refers to an investment relationship, not a firm, no record of this investment need appear in public documents. One party to an sG makes a limited-liability investment in the other’s activities, earning a share of profits instead of a fixed return as with a loan contract. The relationship can exist between any combination of natural or legal persons. A single firm could have distinct, silent investments from multiple investors who might not know of one another. Given the lack of registration, empirical studies cannot pin down how often sGs were known to others, or even if multiple investors in a single firm knew of each other’s existence.

The distinction suggests a wrinkle to the thinking that underlies this section. The *stille Gesellschaft* relationship rested on a contract that the entrepreneur could presumably show to others, so a silent partnership arrangement could function in the way our model contemplates. But it might be used in other ways. The investor might want to conceal his wealth. He might also worry that public knowledge of the investment would cause problems for other relationships. For example, an investor might want to provide capital to firm A but still do business with firm A’s competitors. A desire to invest discreetly also reflects the easy

U.S. technology start-ups. One investor reported, for instance, “We made our investment largely because of [PERSON G]. We figured that he had better information than us on [ENTREPRENEUR F] and if he believed in [ENTREPRENEUR F], then we should too.” Firms based on social connections may also behave differently because they have different objectives. Recent survey evidence shows that family entrepreneurs are more inclined to look out for the interests of other stakeholders, including creditors (Mullins and Schoar, 2016). In our model, the connectedness does not change the entrepreneur’s objectives, it just signals quality.

³⁰Some accounts of family firms indicate that they are on average less productive than other firms (Bertrand and Schoar (2006)). The existence of these “missing” firms -and the selection effect they create- would explain this result.

transmission of information in a small social world.³¹

The previous two models considered the role of contractual choices in making capital available to the right kind of entrepreneur. The next three models explore ways in which contractual choices can discipline the behavior of managing partners within the firm.

4.3 What is the role of unpaid capital?

Unpaid capital was ubiquitous in enterprises in the nineteenth and early twentieth centuries. In the Spanish firms registered 1885-1936, thirteen percent of limited partnerships and PLLCs have at least some unpaid capital. For corporations the figure rises to fifty-four percent. The rules for creating a German GmbH explicitly contemplated unpaid capital. The law required a minimum total capitalization of 20,000 Marks, but only one-quarter of that sum had to be paid in before the firm could operate.³²

We focus on the problem of ex post verification. Verification problems could arise in the form of fraudulent bankruptcy or an inability to determine whether a project had succeeded. Geographically separated partners might not fully know the firm's condition.³³ An investor and an entrepreneur must decide whether to invest 1 unit each in a project that succeeds with probability p (which is known to both players) and if successful pays out profit $\pi > 2$. If the project fails, the payout is zero. For simplicity, we assume that profits are shared equally. The timing is as follows: first, the investor decides whether to invest in the project; then, the uncertainty is realized; and finally, in case of success, the entrepreneur announces whether the project was a success. The unpaid capital functions much like collateral in a lending model. We focus first on the entrepreneur's uncalled capital. There are two cases: (i) the no-collateral case and (ii) the collateral case. The entrepreneur announces a profit of π_a . Under (i), the entrepreneur earns $\pi - \frac{\pi_a}{2}$ in case of success, and the investor earns $\frac{\pi_a}{2}$. Under (ii), the entrepreneur pledges some collateral C before the project is undertaken,

³¹The distinction between the limited partnership and the sG appears after the 1808 French *Code de Commerce*, which does not mention the latter. According to that code, the limited partners' names could not be part of the firm's name, and there was no commercial registry, so, as Kessler (2003) stresses, the limited partners' identity could be kept secret. The 1794 Prussian *Allgemeine Landrecht* uses the French term for a limited partnership (*Société en commandite*) and the German term *stille Gesellschaft* to mean the same thing. The distinction appears clearly in the 1861 all-German commercial code.

³²The firm could also stipulate the ability to demand that owners make capital contributions in excess of their original investment, even if fully paid in. Our model sets aside several issues important in specific times and places. The logic of unpaid capital for corporations resembles the ideas we lay out in the text, but the practice involved additional difficulties with large numbers of dispersed shareholders. Some corporations issued limited-liability shares with unpaid capital available under terms specified in the firm's articles of association. Others issued limited-liability shares with an extra "reserve" liability available to creditors only if the firm went bankrupt. Some nineteenth-century observers argued that unpaid capital was unlikely to be available to firms in trouble, because investors would sell such shares to impecunious individuals for whom capital calls meant nothing. (The same issue, of course, arises with unlimited liability.) Turner (2009) discusses these liability regimes for British banks, stressing legal and firm-level impediments to the strategic sale of shares subject to additional capital calls. For the GmbH's ability to demand extra capital payments, see Germany (1892, §26-28). The U.S. National Banking Act (1863) required national banks to have double liability for shares until 1933. Many states adopted a similar provision for state banks. Macey and Miller (1992) view the requirement as a success, because over the life of the law, more than half of the additional levies were successfully extracted from owners of affected banks. Grossman (2001) shows that double liability reduced bank risk-taking but did not guarantee bank stability in the face of systematic shocks. See Grossman and Imai (2015) for additional evidence on British banks.

³³Unpaid capital could also alleviate selection and moral hazard problems. Success need not be literally unobservable. Courts may have trouble enforcing claims even if success or failure is relatively straightforward to observe.

and if he announces the failure of the project, C is lost. In case of success, payoffs are $\pi - \frac{\pi_a}{2} - C$ and $\frac{\pi_a}{2}$ if $\pi_a \neq \pi$, or $\pi - \frac{\pi_a}{2}$ and $\frac{\pi_a}{2}$ otherwise.³⁴

We start with the no collateral case, (i). The entrepreneur's payoff is $\pi - \frac{\pi_a}{2}$. In the case of success, announcing failure yields a strictly greater payoff of $\pi > \frac{\pi_a}{2}$. Thus the entrepreneur will always claim the project is a failure. Anticipating this, no investor will join the venture, since the return is -1 . This dismal result implies that in the presence of ex-post verification problems, worthwhile projects (those for which, $p \cdot \pi \geq 2$) will not be undertaken. Now introduce collateral, as in (ii). If the project fails, the entrepreneur loses C , and his payoff from announcing success is $-\frac{\pi_a}{2}$. So long as $C \geq \frac{\pi_a}{2}$, the entrepreneur always wants to announce the truth. Knowing this, the investor will invest whenever it is social optimal to do so; his expected payoff is $p \cdot \frac{\pi}{2}$.³⁵

Unpaid capital lies at the heart of partnership arrangements. Until recently, all partnerships had at least one owner with fully unlimited liability; this is a form of unpaid capital. This model demonstrates the role of this arrangement. Investors may be reluctant to contribute in cases where an entrepreneur can easily (and falsely) claim failure. Extending liability beyond the entrepreneur's paid-in contribution makes truthful revelation incentive-compatible, and can therefore be useful even in the extreme case when the collateral is entirely useless to the investor.³⁶ The institution of unpaid capital reduces the number and types of missing firms. Worthwhile business ventures might not attract capital if ex-post verification limitations make it easy for managers to embezzle or otherwise put their interests before the firm's.

This model shows how legal form can discipline a single managing partner. The next model considers conflicting incentives with multiple managing partners

4.4 Ordinary versus limited partners

In most jurisdictions an entrepreneur could take on a partner in one of two ways: as an ordinary or a limited partner. The literature on limited partnerships stresses different aspects of their appeal to investors. Kessler (2003) emphasizes the attractiveness of an investment that could be anonymous and did not involve

³⁴This is equivalent to saying that the collateral has no value to the investor (clearly an extreme assumption); a more realistic version is that some fraction of C is transferred to the investor. However, this only makes the use of pledged capital more appealing. If the capital was of value to the investor in "bankruptcy," then the collateral would reduce the ex post verification problem ex ante and help to make the investor whole in the case of failure. We abstract from any problems a creditor may have in getting the unpaid capital.

³⁵The entrepreneur's participation constraint $p \cdot \frac{\pi}{2} + (1 - p) \cdot (-C) \geq 1$ must also hold. This constraint requires that the success probability be large enough to compensate the entrepreneur for the risk of losing C .

³⁶Our argument holds even if investors could not meet their capital calls either because they had suffered a wealth shock or because their assets were too illiquid. Uncalled capital has the incentive effects we model as long as the investor has something to lose. That is why we stress ordinary partners, who operate the firm. Some historical accounts emphasize the impact of unpaid capital on leverage: uncalled capital reassured creditors, who knew that the firm could call on more capital in the bankruptcy state. Our argument deals with the entrepreneur's incentives as well as the other investor's willingness to invest. The entrepreneur's incentives are irrelevant to the leverage argument; the firm's bankruptcy could result from simple "bad luck." Unpaid capital pledged by limited partners would be relevant to this concern. Unpaid capital has a further benefit, if there is an opportunity cost to investment in the firm.

a role in managing the firm. The French limited partnership’s “primary purpose was to facilitate investment by wealthy noblemen who were fearful that public disclosure of their involvement in the base practice of commerce would jeopardize their noble status.” (p.512) She stresses the difference between the French *société en commandite simple* and the analogous form introduced into New York state in 1822, suggesting that limited liability in the French version was relatively unimportant.³⁷ The New York form, crucially, offered limited liability to some investors. Hilt and O’Banion (2009) studied the New York limited partnership over the four decades from its inception. Limited partners often knew the general partners in a given firm, but in comparison to ordinary partnerships were less likely to be kin. Limited partners used the form to invest in a number of different firms, allowing hands-off investments and diversification beyond what could be achieved as a general partner. The Spanish limited partnership also relied less heavily on kin ties among owners than its ordinary counterpart.

The two kinds of partners differ in two dimensions; here we focus on the fact that another ordinary partner can help run the firm, while a limited partner cannot. The problem is interesting in both the perfect- and the imperfect-information environment.

4.4.1 When partner quality is observable

Consider the perfect information case first. The firm’s success probability P_i is the product of an entrepreneur’s ability p_i and the ability of up to n partners, $P_i = p_i \cdot \prod_{j=1}^n p_j$. If not all spots in the team are filled, this is equivalent to hiring “dummy partners” of some low ability p_0 . The (risk-neutral) entrepreneur and each (risk-neutral) potential partner have one unit of capital to invest, and an outside option whose return is normalized to zero. If the projects succeeds, the firm earns $\pi > n$; if it fails, the firm earns nothing at all.

The entrepreneur knows his own skill level. If he also can observe the skill levels of all $m > n$ potential partners, then the model is slightly trivial but serves as a benchmark. The timing is as follows: the entrepreneur offers some subset of the potential partners (at most n) a place in the firm, and then all partners offered a place must simultaneously decide whether to accept or reject the offer. To maximize $P_i = p_i \cdot \prod_{j=1}^n p_j$, the entrepreneur accepts any partner with an ability level of $p_j \geq p_0$ as managing partner; if there are more than n such individuals, the entrepreneur chooses the n highest skilled ones. Each partner, including the entrepreneur, earns $\frac{1}{n} p_i \cdot \prod_{j=1}^n p_j \cdot \pi$. Since ability is observable and being a managing partner entails no cost, it is in the interest of any chosen partner j to accept an active role in the firm if and only if $p_j \geq p_0$.

³⁷Studies of the early-modern Florentine limited partnership offer a warning about the specificity of enterprise forms; variations on limited-partnership rules could be extensive. Goodman (1981, p. 426) notes that the early-modern *accomandita* required registration of all partner names, while Litchfield (1969, p.696) stress that “no legal obstacle prevented Florentine nobles from investing in companies or even taking part in the management of great Florentine companies for several generations.” Carmona (1964) argues, for a slightly earlier period, that limited liability was the essential feature of the limited partnership in Florence.

4.4.2 Imperfectly observable partner quality

A more interesting problem arises if the entrepreneur cannot perfectly observe the quality of the potential managing partners; now the choice between managing and limited partners is not trivial. Managing partners contribute skills to the firm and therefore can help it succeed, but the addition of multiple partners may make the moral hazard problems worse.³⁸ The intuition for this result rests on the fact that multiple managing partners cannot be made the single residual claimant; therefore the first-best solution cannot be achieved. Consider a firm with two managing partners, indexed by i and j . The success probability reflects not just fixed abilities, but incorporates the effort levels, e_i and e_j respectively. Individuals differ by their cost-of-effort functions $C_i(e_i)$ and $C_j(e_j)$. The success probability is now determined both by the (privately chosen) effort levels and the (privately known) abilities, as embodied in the cost-of-effort functions. Holmstrom (1982, Theorem 1) shows that it is impossible to allocate the profit that leads to a balanced budget, generates the optimal effort levels, and is a Nash equilibrium. With imperfect information about the contribution of the managing partners, limited partners become more appealing.³⁹

These limitations do not, of course, imply that in a world of imperfect information, multiple ordinary partners were rare. Some investors insisted on an ordinary partnership as the price of their capital or some other input. Before cheap transportation and communication, the best way for a firm to operate in more than one locale at once might require personnel physically located in two or more places. One way to organize such firms would be a sole proprietorship or limited partnership with one managing partner, and employees in the other locations. But we know of many partnerships where the several ordinary partners each lived in a different place; the point here is not that we never see multiple managing partners, it is simply that information imperfections reduce the number of managing partners relative to the first best.

The preceding models focus on the managing partner's incentives or quality. The next, and final, model shows that legal form also disciplines the enterprise's non-managing partners and other investors.

4.5 Locked-in capital

The corporate-finance literature also ignores the issue of capital lock-in. This omission is natural; all corporations lock in capital.⁴⁰ But partnerships do not. Locked-in capital refers to the inability of any owner to retrieve his investment from the firm directly. If a corporate shareholder wants to liquidate the investment,

³⁸Here we are implicitly abstracting away from enforceable contracts that limit decision-making to a subset of partners, or that require unanimous consent for certain decisions. In some jurisdictions a partnership's articles of association could include such provisions and they would bind on the firm's owners.

³⁹This discussion focuses on potential managing partners' skill and effort. Additional complications may arise if potential managing partners have unequal levels of wealth, since wealthier partners may be more attractive creditor targets in the case of bankruptcy.

⁴⁰Some corporate-law scholars argue that capital lock-in is *the* essential feature of corporations and has been neglected in earlier accounts. See Stout (1999), and Blaire (2003).

his only option is to sell the share to someone else. This feature has two related implications. Firms with locked-in capital are more suitable to projects that require a long stream of investment before any return can be expected. The lock-in feature amounts to a commitment device for the investors. Capital lock-in also obviates the potential for hold-up that afflicts forms such as partnerships, which are effectively at-will. A partner who wants to withdraw his investment can generally do so. Because of this, owners of partnerships are always subject to possible hold-up by their partners. Shifting from a partnership to an enterprise form that locks in capital amounts to a significant adjustment of capital structure, and represents an important feature of corporations and similar forms. The several countries that introduced PLLC forms in the late nineteenth and early twentieth centuries all viewed them slightly differently. The German GmbH resembled a corporation somewhat more than the French SARL, for example. But all of these forms shared a common feature that corporations had and partnerships lacked: they locked-in capital, just as in a corporation.⁴¹

For simplicity, we focus here on lock-in for the non-managing partner, although the same logic applies to all owners. Assume the entrepreneur, E , and his potential partner, P , each have one unit of capital. The firm needs two units of capital to operate, one in period 1 and one in period 2. In period 3, the firm generates revenues $\pi > 2$, leaving a profit of $\pi - 2$ to be shared. This return requires an investment of at least one unit of capital in each period; with smaller investments the return is 0. In the case without lock-in, the timing is as follows: in period 1, E decides whether to invest or not. In period 2, P offers his capital to E , and then E decides whether to accept.⁴² In period 3, payoffs are realized. Figure 1 shows the game tree for this game.

In the unique subgame-perfect equilibrium of this game, P knows that E in period 2 will accept any offer that leaves him with a payoff greater than -1 , and will therefore offer to keep the entire return π , giving payoffs for the entrepreneur and partner respectively of $(-1, \pi - 1)$. Knowing this, E will not invest in the firm in period 1, even though it would be socially optimal to do so. P 's inability to commit keeps this profitable enterprise from being undertaken.

Now consider the case where P has to make his offer to E in period 1, without a chance to renegotiate in period 2. To induce E to accept, P will offer to keep $\pi - 1$, leaving E indifferent between investing and not investing. The venture will then be undertaken, leading to payoffs $(0, \pi - 2)$. Therefore, locking in capital prevents partners from exploiting the hold-up problem inherent in running firms; removing the threat of hold-up expands the number of worthwhile businesses undertaken, reducing the number of missing firms. Institutional innovations such as the corporation or PLLC, because they lock in capital, support better use

⁴¹Guinnane et al. (2007) discuss the more general problem of “untimely dissolution,” which reflects the identity of a partnership with specific individuals. One partner’s death can trigger the firm’s demise. Hold-up in our sense is a type of untimely dissolution that reflects strategic behavior.

⁴²Note that this is equivalent to P putting his capital into the firm in period 1, but being allowed to take it out without penalty in period 2 with a chance to renegotiate the agreement.

of resources. This is particularly important in industries that rely on continued investment, large up-front outlays, or only pay out profits after a long period of time.⁴³

5 Conclusions

This paper draws on and extends simple models from the economics of information and incentives to study the firm's choices concerning equity and debt. We focus on the smaller firms that were crucial to now-advanced economies from before industrialization until the early twentieth century. Our analysis starts from the assumption that the core information and incentive problems are the same for all enterprises, regardless of legal form. These problems affect capital structure differently both because of legal rules that constrain the two classes of enterprises differently, and because of broader differences in the environments the firms face. Each of our models generates an equilibrium in which the firm has specific classes of equity and debt. Given the legal rules, these capital-structure decisions also imply an enterprise form; for example, only limited partnerships can create limited-liability equity in a partnership setting.

Our results help elucidate themes from the business-history and other literatures, and in some cases point to new avenues of research. The first model (section 4.1) explains why entrepreneurs usually invest much of their own wealth in their firms, even though such decisions violate common-sense notions about diversification. The model also helps to explain why wealthy entrepreneurs do better and can have larger firms; the scale reflects both their own wealth and their ability to attract outside funding by investing in their firm and thus signaling their quality. The second model (section 4.2) turns to the issue of social connections and their role in financing firms. The entrepreneur may be too poor to signal the value of his project, but if there are wealthier people who can observe his quality then those people can invest in the firm and thus allow hands-off creditors to piggyback on signals they cannot see directly. We know that most early partnerships combined people from the same social circles or region. This model also implies a novel explanation for a general phenomenon: the tendency for firms in a given sector to cluster in a region, and for their owners to come from specific religious or ethnic groups. Regional or ethnic affinity allows connectedness to flourish.

Unpaid capital was an ubiquitous feature of capital structure; an unlimited partner by definition has unpaid capital, and many firms with limited liability (including corporations) also adopted this structure. The literature has discussed several reasons for unpaid capital. Our third model (section 4.3) focuses on one: it disciplines entrepreneurs who might otherwise falsely report the condition of their firm. This result implies that unpaid capital is particularly important if investors (or, potentially, the courts) know little about the

⁴³The sectoral differences on display in Figure 2 doubtless reflect forces beyond those contemplated by this model. But it is worth noting that by 1925, Germany's GmbH played an important role in a variety of sectors, including those, such as chemicals, with significant sunk capital.

firm's technology or the entrepreneur's actions. We would expect to see reliance on unpaid capital in the new and relatively opaque sectors that characterized industrialization.

Partners can be of two types. In general, ordinary partners assume unlimited liability and can help manage the firm. While specific roles in governance could be modified by contract, we know that partners who did not play a role in governance typically took a limited-partner role (section 4.4). The result implies a trade-off that generates different partnership structures in different settings. When the firms structure allows good partners to make other good partners better, then multiple managing partners aid the firm. For example, a commercial firm with four managing partners located in four cities may do better because each partner can take advantage of opportunities that arise locally and increase sales for the firm as a whole. This may be true even if one partner is not as good as the others. On the other hand, if a firm's technology implies that all managers will be in the same location, then a less-able manager can only reduce the value of the best managers. However, if geography or technology makes it simple for partners to harm the firm for private benefit, then the firm will do better with fewer -possible only one- managing partner.

Finally, we considered the problem of hold-up in firms (such as partnerships) that cannot lock in capital (section 4.5). Accounts of the PLLC forms (such as the GmbH) typically explain the new form's popularity by noting that it offered all owners limited liability without the formalities required of corporations. We stress another feature: the ability to commit to longer-term projects that involved specific capital.

We have argued that there are many choices of enterprise form beyond the simple trade-off of equity and debt. Entrepreneurs used this flexibility in creating new firms. Corporations were larger than firms organized in other ways, and they persisted longer. But even after the advent of general incorporation, partnerships remained more popular than corporations in many jurisdictions. After the PLLC's introduction, the relative weights of corporations, partnerships, and the new form shifted again. Table 2 shows this pattern clearly. The PLLC's popularity differed across countries in ways that reflect the peculiarities of national law as well as the existing rules for corporations. But our analysis highlights two general reasons for the shift from the ordinary partnership to the PLLC. The PLLC's flexibility makes it possible for the entrepreneur, as in our models, to risk much of his own wealth to demonstrate his ability to other investors. The PLLC improves on the partnership, however, by allowing investors to actively manage the firm and still limit their liability. This partially relaxes the trade-off that underlies our analysis of ordinary versus limited partners. Perhaps most importantly, PLLCs can lock in capital and those do not face the threat of hold-up and untimely dissolution that limits a partnership's ability to invest in certain kinds of projects. Guinnane and Martínez Rodríguez (2018) show that larger firms and firms especially vulnerable to dissolution costs (such as those in mining and other sectors with sunk investments) preferred the corporation. Their estimates imply that in the absence of the Spanish PLLC, about one-third of the actual PLLCs would have organized as corporations. This

high figure probably reflects Spain's flexible corporation rules. Most importantly, they report a placebo tests demonstrating that firms indeed saw enterprise form as an object of choice: replacing the firm's actual form with a randomly-assigned form (a type of placebo) results in dramatically weaker model fit.

This article contributes to understanding why entrepreneurs chose specific enterprise forms, stressing the capital-structure decisions that play an important role in the corporate-finance literature. The information and incentive problems that underlie our models have been studied extensively, but to our knowledge, these ideas have not been used to understand the choice of enterprise form. The few economic studies of partnerships and corporations tend to focus on single features to understand the role of, for example, particular kinds of capital investment, abstracting from the broader but essential features of the differing enterprise forms. Most legal discussions of enterprise have stressed either taxation issues (which are clearly important, although not in the period we stress), or the attractiveness of anonymous investments to nobles and others unwilling to have their names attached to firms. While setting aside some issues that mattered to the entrepreneur's choices, we have provided an analysis that begins to flesh out the economic analysis of enterprise form choice.

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Appendix

A.1 An example of pooling equilibria in Model 1

Let $P(p_i = p_L) = 0.5$ for simplicity. One pooling equilibrium occurs for $s_i = 0$ regardless of type, $P(p_i = p_L \mid s_i = 0) = 0.5$ and $P(p_i = p_L \mid s_i > 0) = 1$. The first of these beliefs is true in equilibrium, and the second is off the equilibrium path. Next consider a financier's decision to deviate. Given his beliefs, the zero (expected) profit condition pins down the rates they can offer to any entrepreneur investing either $s_i = 0$ or $s_i > 0$

$$.5(p_H r_{s_i=0} + (1 - p_H)(-1)) + .5(p_L r_{s_i=0} + (1 - p_L)(-1)) = 0 \quad (19)$$

$$p_L r_{s_i>0} + (1 - p_L)(-1) = 0 \quad (20)$$

and therefore he has no profitable deviation available. Finally, the entrepreneur (regardless of type) does not have a profitable deviation either, since investing $s_i > 0$ increases his risk and also worsens the rate he has access to. Thus, this combination of beliefs and strategies is an equilibrium. It is however not unique.

A.2 Model 2 with risk-neutral partners

The entrepreneurs are risk-neutral, have zero wealth and a given ability $p_i \in \{p_L, p_H\}$, $0 < p_L < p_H < 1$, that denotes the likelihood of their project succeeding. These projects again require a fixed investment of 1 unit of capital and deliver $\pi_i > 1$ in case of success, and zero otherwise. Each entrepreneur i knows one potential partner P_i with wealth W . A potential partner gets a private signal, or message, $M \in \{G, B\}$ of the entrepreneur's ability. These signals are informative in the sense that $P(M = G \mid p = p_H) = P(M = B \mid p = p_L) = q$ where $q > \frac{1}{2}$. Partners here are assumed to be risk neutral too.

The potential partners have the option of joining the firm and adding equity to the enterprise. The partner might be able to finance the firm entirely without outside investments. But we focus on the more interesting case where the firm still needs additional finance from the credit market. Any remaining financing comes from loans provided from a pool of uninformed financiers. The financiers have access to safe investments that provide a fixed return r_0 . We assume the partner makes the entrepreneur an offer, based on the private signal; the entrepreneur then decides whether to accept the partnership offer; finally, the uninformed financier observes the decisions of the partner and the entrepreneur, and offers the entrepreneur residual financing.

We start with the decision by the potential partners to invest in the venture. For $M = G$, $P(\text{success}) = qp_H + (1 - q)p_L$. Conditional on receiving a good signal, the partner P_i maximizes his expected earnings by

investing a share s_G , by solving

$$\begin{aligned} \max_{s_G} & (p_H q + p_L (1 - q)) \cdot [\pi \cdot s_G W + (1 + r_0) (1 - s_G) W] \\ & + (1 - p_H q - p_L (1 - q)) \cdot [(1 + r_0) (1 - s_G) W] \end{aligned} \quad (21)$$

This leads partners to invest his whole wealth if and only if

$$(p_H q + p_L (1 - q)) \cdot \pi \geq (1 + r_0) \quad (22)$$

and similarly, if the signal is bad, they invest their whole wealth if

$$(p_L q + p_H (1 - q)) \cdot \pi \geq (1 + r_0) \quad (23)$$

In other words, partners invest if either the return is large enough or the signal is good enough.

Next, we turn to the entrepreneur's decision to accept a partner. We assume here (as in the text) that in equilibrium, the entrepreneur accepts all partnership offers. This means the entrepreneur obtains capital from his partner equal to

$$K_P = s_G W \quad (24)$$

Now consider the potential lender. The entrepreneur faces a funding gap of $1 - K_P$, which the credit market has to fill. We assume that the credit provider observes only the funding provided by the partner, K_P . The financier's zero-profit condition implies a required rate of return of

$$1 + r = \frac{1 + r_0}{\hat{p}} \quad (25)$$

where \hat{p} is the financier's estimated probability of the success of the venture. By observing the partner's investment, the financier can deduct that the probability that the entrepreneur is high-skilled. Entrepreneur's with partners who know their ability therefore receive lower interest rates from uninformed financiers, if the entrepreneur is too poor to use his wealth to credibly signal his ability.

A.3 Extending Model 2 to multiple partners

Assume that the entrepreneur knows a group of people who have some individual wealth, and who are known to have private signals about his quality. These potential partners may be better-informed about the entrepreneur because of specialized knowledge about an industry, because of where they live, or because they know the entrepreneur personally. Assume the entrepreneurs are risk-neutral, have wealth w_i and a given

ability $p_i \in \{p_L, p_H\}$ that denotes the likelihood of their project succeeding. These projects require a fixed investment of 1 unit of capital and deliver $\pi_i > 1$ in case of success, and zero otherwise. Each entrepreneur i has a pool of n (risk-averse) potential partners P_{ij} with wealth W . Each of these potential partners gets a private signal, or message, $M_{ij} \in \{G, B\}$ of the entrepreneur's ability. These signals are informative in the sense that $P(M = G \mid p = p_H) = P(M = B \mid p = p_L) = q$ where $q > \frac{1}{2}$.

The partners can provide additional equity themselves. Any remaining financing need comes from loans provided from a pool of uninformed financiers. Safe assets provide outside options r_0 . The timing is as follows: First, the potential partners simultaneously make their offers, based on their private signal; then, the entrepreneur decides which ones to accept and reject; finally, the uninformed financier observes the number and investments of the partners and offers the entrepreneur residual financing. We start with the decision by the potential partners to invest a share s_i in the venture.

Note that for wealth levels $w_i \leq \bar{w}$, entrepreneurs will go ahead with the project regardless of whether the success probability is high or low. Therefore the poor entrepreneurs cannot distinguish themselves if their type is high. Therefore, for poor entrepreneurs the potential partners have to rely entirely on private signals.

For $M = G$, $P(\text{success}) = qp_H + (1 - q)p_L$. So, conditional on receiving a good signal, the partner P_{ij} maximizes his expected earnings by investing

$$s_G = \frac{(p_H q + p_L (1 - q)) \pi - (1 + r_0)}{\pi - (1 + r_0)} \quad (26)$$

and similarly, if the signal is bad,

$$s_B = \frac{(p_L q + p_H (1 - q)) \pi - (1 + r_0)}{\pi - (1 + r_0)} \quad (27)$$

Above \bar{w} , only entrepreneurs with good signals will invest, and since potential partners can observe wealth, they instead solve

$$\max_s p_H \log(\pi W s + (1 + r_0) W (1 - s)) + (1 - p_H) \log((1 + r_0) W (1 - s)) \quad (28)$$

giving a solution of

$$s_W = \frac{p_H \pi - (1 + r_0)}{\pi - (1 + r_0)} \quad (29)$$

Next, we turn to the entrepreneur's to accept a partner. We assume here (and verify separately) that in the equilibrium, the entrepreneur will want to accept all partnership offers. If we call the number of good

offers n_G , this means the entrepreneur gets capital from partners equal to

$$K_P = n_G s_G W + (n - n_G) s_B W \quad (30)$$

for $w < \bar{w}$ and

$$K_P = n s_W W \quad (31)$$

above.

Now consider the potential lender. From above, the entrepreneur is left with a funding gap of $1 - w_i - K_P$, which the credit market has to fill. We assume that the credit provider observes the entrepreneur's wealth w_i , the number of potential partners, n , as well as the invested capital share s_{ij} of any actual partner j . For entrepreneurs with wealth less than \bar{w} , the credit provider uses Bayes' rule estimate to \hat{p} , the probability that the entrepreneur is of high quality:

$$\hat{p} = \frac{\binom{n}{n_G} q^{n_G} (1 - q)^{n - n_G} \cdot \frac{1}{2}}{\binom{n}{n_G} q^{n_G} (1 - q)^{n - n_G} \cdot \frac{1}{2} + \binom{n}{n_G} (1 - q)^{n_G} q^{n - n_G} \cdot \frac{1}{2}} \quad (32)$$

where $\hat{p} = P(p = p_H \mid \text{exactly } n_G \text{ signals are good})$. The financier accordingly offers a required rate of return of

$$1 + r = \frac{1 + r_0}{\hat{p} \cdot p_H + (1 - \hat{p}) p_L} \quad (33)$$

which is dictated by the zero profit condition. For entrepreneurs with wealth above \bar{w} , however, the credit provider knows that the entrepreneur is of the high type, and offers credit at interest rate

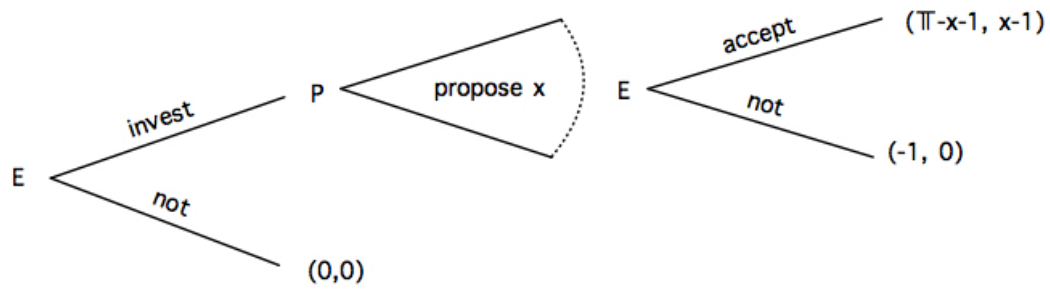
$$1 + r = \frac{1 + r_0}{p_H} \quad (34)$$

Finally, the entrepreneur decides whether to accept the financier's offer. An entrepreneur accepts a credit offer if and only if

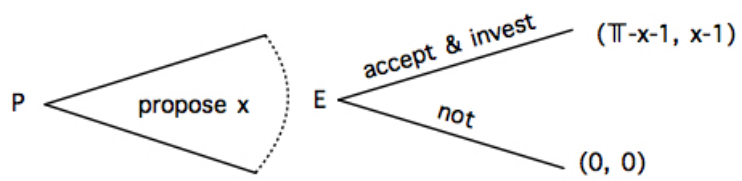
$$p_i (\pi (S - K_P) - (1 + r) (1 - K_P)) - (1 - p_i) w_i \geq 0 \quad (35)$$

That is, whenever

$$p_i \geq \frac{w_i}{\left(\pi (1 - K_P) - \left(1 + \frac{1 + r_0}{\hat{p} \cdot p_H + (1 - \hat{p}) p_L} \right) (1 - K_P) + w_i \right)} \quad (36)$$



a.



b.

Figure 1. Investment without lock-in (Panel a.) and with lock-in (Panel b.).

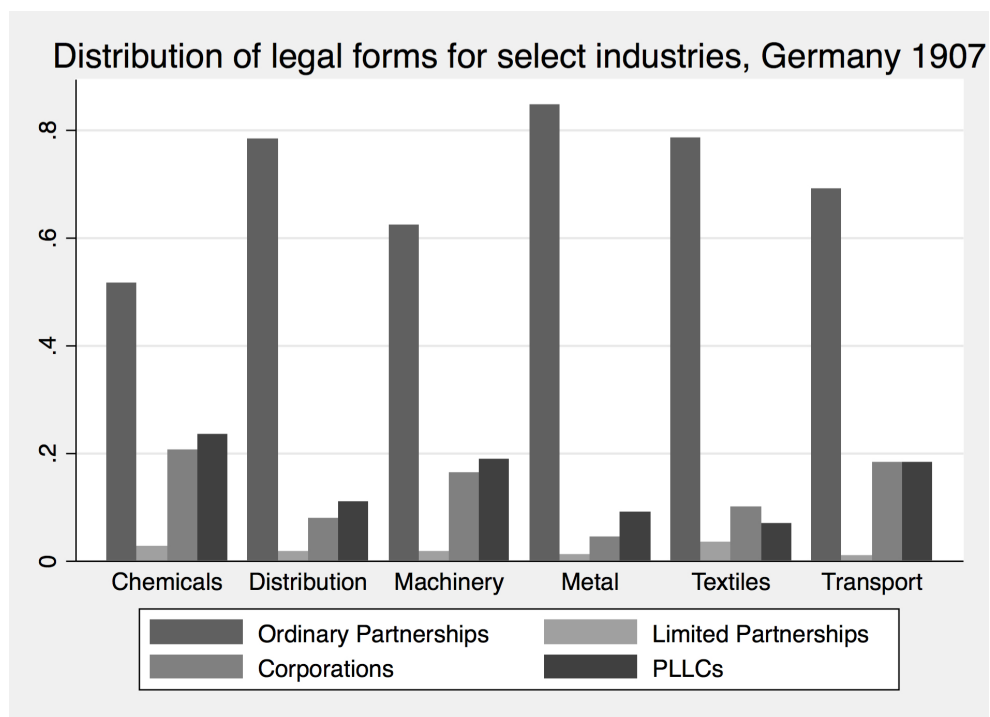
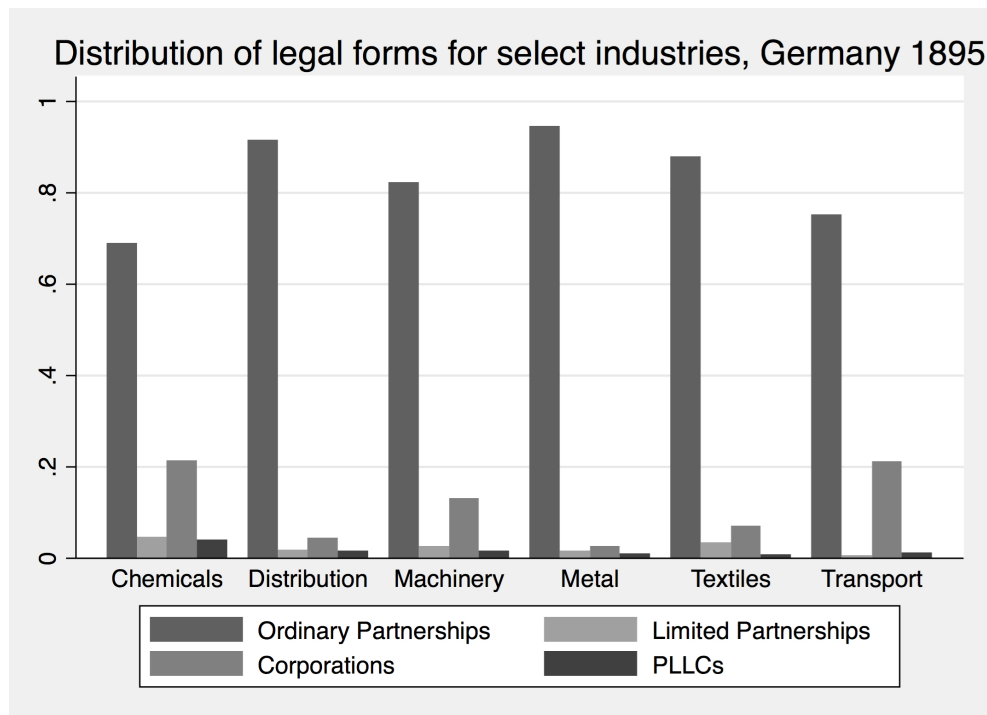


Figure 2. Distribution of enterprise forms in select industries in Germany, 1895 and 1907.

Table 1: A (very) partial taxonomy of dimensions for enterprise choice

Dimensions	Possibilities
Owners	One; a limited number great than one; unlimited number
Managers	One; many
Investor types	Identifiable; anonymous
Limited liability	For no owners; for some owners; for all owners
Trade-able shares	Always tradable; tradable but not on equity markets; tradable with restrictions imposed by the firm or other owners
Un-called capital	Yes; no

Table 2: The Menu of Organizational Choices in France, Germany, Spain, the United Kingdom and the United States

Form	Definition of Form	Availability	Percentage of new firms			
			c. 1892	c.1907	c.1930	
Ordinary partnership	Two or more partners, all unlimitedly liable	France: yes	70	62	16	
		Germany: yes	72	35	20	
		Spain: yes	75	70	20	
		UK: yes	NA	NA	NA	
		US: yes	NA	NA	NA	
Limited partnership	One or more general partners with unlimited liability, and one or more special partners who cannot participate in management but who have limited liability	France: yes	19	19	2	
		Germany: yes	10	7	6	
		Spain: yes	15	15	4	
		UK: only after 1907	NA	NA	NA	
Limited partnership with tradable shares	Same as limited partnership, except special partners' shares can be bought and sold on the market	US: yes, but in an unattractive form	NA	NA	NA	
		France: yes				
		Germany: yes				
		Spain: yes, but not widely used				
		UK: no				
Corporation	All members have limited liability and their shares are tradable	US: no				
		Required special permission until:				
		France: 1867	10	16	20	
		Germany: 1860s–1870, varied by state	10	7	6	
		Spain: General incorporation from 1892 to 1847, reintroduced 1869 and reaffirmed 1885	10	12	38	
PLLC	All members have limited liability but their shares are not tradable	UK: 1844 without limited liability and 1855–56 with limited liability	NA	NA	NA	
		US: mostly middle third of nineteenth century, varied by state	NA	NA	NA	
		France: 1925	NA	NA	62	
		Germany: 1892	5	42	63	
		Spain: Legally possible after 1885, specific regulations introduced 1919	NA	NA	35	
		UK: 1907				
		US: 1870s–1880s for a few states, but unattractive; laws in 1950s–1970s allowed close corporations to mimic; 1980s–1990s				

Source: Adapted from Guinnane and Martínez Rodríguez (2014). Figures do not always sum to 100 because of the omission of the share partnership and other minor forms. The underlying data for France and Germany are reported in Guinnane et al. (2007). For the U.S. and Britain partnership figures are not available. The Spanish PLLC did not exist until 1920. The French PLLC was created in 1925.